

THE CLAIMS

WHAT IS CLAIMED IS:

1. A remote unitary module for simultaneous bi-directional transmission of voice and data over a communications conduit, wherein said remote unitary module is positionable at a remote end of the communications conduit, and wherein there is provided a pair of signals, the pair of signals consisting of a head-end signal and a remote-end signal, the remote-end signal originating along the remote end of the communications conduit, and the head-end signal originating along a head-end of the communications conduit,
- a digital expression of said head-end signal having been PCM encoded into a first predetermined PCM slot within a head-end PCM bitstream and modulated to a first predetermined frequency for transmission over said communications conduit, thereby creating a modulated head-end PCM bitstream,
- comprising:
- (a) a unitary module PCM encoder, said unitary module PCM encoder encoding the remote-end signal into a second predetermined PCM slot, thereby creating an encoded remote signal;
 - (b) a unitary module RF modulator in electronic communication with the remote end of the communications conduit, said unitary module RF modulator modulating said encoded remote signal to a second predetermined frequency, thereby creating a modulated remote signal, and, presenting said modulated remote signal to the remote end of the communications conduit for transmission thereon;
 - (c) a unitary module RF demodulator in electronic communication with the remote end of the communications conduit, said unitary module RF demodulator

receiving said modulated head-end PCM bitstream, and
demodulating said modulated head-end PCM bitstream, thereby creating a
baseband PCM bitstream signal; and,

(d) a unitary module PCM decoder, said unitary module PCM decoder

5 decoding said baseband PCM bitstream signal,

extracting a signal from said first predetermined PCM slot, thereby

creating a digital representation of the head-end signal.

2. A remote unitary module according to Claim 1, further comprising:

10 (e) an analog to digital converter, said analog to digital converter being in electronic
communication with said unitary module PCM decoder and converting said
digital representation of the head-end signal to an analog signal; and,

(f) an analog connector, said analog connector in electronic communication with said
15 analog to digital converter and providing access to said analog representation of
the head-end signal.

3. A remote unitary module according to Claim 2, wherein said analog connector is a
telephone connector and further comprising:

(g) at least one telecommunications device attached to said telephone connector, said
20 telecommunications device originating the remote-end signal and receiving the
analog representation of the head-end signal.

4. A remote unitary module according to Claim 3, wherein said telecommunications device is selected from the group consisting of a telephone, a fax machine, and a computer modem.

5 5. A remote unitary module according to Claim 1, wherein said unitary module RF demodulator further comprises:

(c1) a bandpass filter for filtering the modulated head-end PCM bitstream prior to demodulation, said bandpass filter having a lower filter limit and an upper filter limit, said lower filter limit being lower than said first predetermined frequency, and said upper limit being above said first predetermined frequency.

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6. A head-end module for simultaneous bi-directional transmission of voice and data over a communications conduit

wherein said communications conduit has a head-end and at least one remote end, wherein said head-end module is positionable near the head-end of the communications conduit,

wherein is provided at least one pair of signals, each pair of signals consisting of a head-end signal and a remote-end signal,

the head-end signal of each pair originating along the head-end of the communications conduit,

the remote-end signal of each pair originating along a particular remote end of the communications conduit, and,

all of said remote-end signals being digitally expressed within separate PCM slots of a same remote modulated PCM bitstream which has been modulated to a second predetermined frequency for transmission over the communications conduit,

5 comprising:

- (a) a head-end PCM encoder in electronic communication with the head-end of the communications conduit, said head-end PCM encoder

encoding each head-end signal into a different predetermined PCM slot, thereby creating a head-end PCM bitstream signal containing digital representations of each of said head-end signals;

- (b) a head-end RF modulator in electronic communication with said head-end PCM encoder, said head-end RF modulator

modulating said head-end PCM bitstream signal to a first predetermined frequency, thereby creating a modulated bitstream signal, and, sending said modulated bitstream signal to said communications conduit for transmission thereon;

- (c) a head-end RF demodulator in electronic communication with the head-end of the communications conduit, said head-end RF demodulator

receiving the remote modulated PCM bitstream, and

demodulating said modulated PCM bitstream, thereby creating a baseband PCM bitstream; and,

- (d) a head-end PCM decoder, said head-end PCM decoder decoding said baseband PCM bitstream, thereby creating a representation of each of the remote-end signals.

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7. A head-end module according to Claim 6, wherein said head-end PCM encoder further includes an input for receiving said at least one head-end signals, and wherein said head-end PCM decoder further includes an output for sending said representations of each of the remote-end signals.

8. A head-end module according to Claim 6, wherein said head-end PCM encoder input is a multiplexer and wherein said head-end PCM decoder output is a demultiplexer.

9. A head-end module according to Claim 7, further comprising:

(e) a PBX containing an input and output,

said PBX originating said head-end signals,

said PBX output being in electronic communication with said head-end

PCM encoder input and providing said PCM encoder input access to said head-end signals, and,

said PBX input being in electronic communication with said head-end

PCM decoder output and receiving therefrom said representation of each of the remote-end signals.

10. An apparatus according to Claim 6, further comprising:

(e) a forward amplifier, said forward amplifier having a forward amplifier input and a forward amplifier output,

(e1) said forward amplifier input receiving said modulated bitstream signal from said head-end RF modulator,

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- (e2) said forward amplifier amplifying said modulated bitstream signal,
thereby creating an amplified forward bitstream,
- (e3) said forward amplifier output in electronic communication with the
communications conduit and providing said amplified forward bitstream
thereto; and,
- (f) a return amplifier, said return amplifier having a return amplifier input and a
return amplifier output,
- (f1) said return amplifier input receiving said remote modulated PCM
bitstream from said communications conduit,
- 10 (f2) said return amplifier amplifying said remote modulated PCM bitstream,
thereby creating an amplified return PCM bitstream, and
- (f3) said return amplifier output providing said amplified return PCM
bitstream to said head-end RF demodulator.

15 said input being in electronic communication with said RF amplifier and said output

11. An apparatus for sensing and transmitting short signals such as alarms to a head-end
processor over a communications conduit,

20 wherein said communications conduit has a head end and a remote end,
wherein said apparatus is positionable along a remote end of the communications
conduit, and
wherein said head-end processor is positionable along a head-end of the
communications conduit, comprising:

- (a) alarm input means for sensing a changeable status of at least one alarm switch,
~~said alarm input means.~~

generating an electronic signal in response to a change in a status of any of
said at least one changeable status alarm switches;

- (b) an alarm signal generator, said alarm signal generator,
being in electronic communication with said alarm input means, and,
generating an alarm signal in response to said electronic signal;
- (c) a PCM encoder in electronic communication with said alarm signal generator,
said unitary module PCM encoder encoding the alarm signal into a predetermined
PCM slot, thereby creating an encoded remote signal,
- (d) an RF modulator in electronic communication with the remote end of the
communications conduit, said RF modulator
modulating said encoded remote signal to a predetermined frequency,
thereby creating a modulated remote signal, and,
sending said modulated remote signal to the communications conduit for
transmission therethrough;

12. An apparatus for sensing and transmitting short signals such as alarms to a head-end
processor according to Claim 11, wherein said electronic signal contains at least an
indication of which of said changeable status alarm switches experienced a change in
status.

13. An apparatus for sensing and transmitting short signals such as alarms to a head-end
processor according to Claim 11, wherein said alarm signal generator is a DTMF signal
generator and said alarm signal consists of a plurality of DTMF tones.

14. An apparatus for sensing and transmitting short signals such as alarms according to Claim 11, wherein said head-end processor comprises:

- (e) a head-end RF demodulator in electronic communication with the head-end of the communications conduit, said head-end RF demodulator
- 5 receiving the modulated remote signal from the communications conduit, and demodulating said modulated remote signal, thereby creating a baseband PCM bitstream;
- (f) a head-end PCM decoder, said head-end PCM decoder extracting a digital representation of said alarm signal from said predetermined PCM slot of said baseband PCM bitstream; and,
- 10 (g) computer processing means connected to said head-end PCM decoder, wherein said computer processing means is responsive to said digital representation of said alarm signal.

15. An apparatus for sending text and graphics images to at least one predetermined remote receiver over a communications conduit,

wherein the communications conduit has a head-end and at least one remote-end, and,

20 wherein is provided a digital image which is comprised of a plurality of scan lines,

comprising:

- (a) a head-end transmitter portion positionable along the head-end of the communications conduit and in electronic communication therewith, comprising:

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(a1) a head-end computer CPU, said head-end computer CPU for impressing a predetermined digital security key into a predetermined scan line of said digital image, thereby creating a modified digital image,

(a2) a video generator, said video generator converting said modified digital image into a baseband video signal,

(a3) an RF modulator in electronic communication with said video generator, said RF modulator modulating said baseband video signal to a predetermined frequency, thereby creating a modulated video signal,

said RF modulator in electronic communication with said communications conduit, and

said RF modulator providing said modulated video signal to said communications conduit for transmission thereon;

(b) at least one remote-end receiver portion positionable along the remote-end of the communications conduit and in electronic communication therewith, each of said at least one remote-end receiver portions being associated with a unique security key, comprising:

(b1) a tuner in electronic communication with said remote-end of said communications conduit,

said tuner receiving said modulated video signal and producing a baseband video signal therefrom,

(b2) a remote-end CPU, said remote-end CPU in electronic communication with said tuner and

reading said baseband video signal,

forming a binary representation of said baseband video signal, and,
extracting said predetermined digital key from said predetermined
scan line; and,

(b3) computer RAM connected to said remote-end CPU, said remote-end CPU
storing said binary representation of said baseband video signal in
computer RAM if said unique security key matches said predetermined
digital security key.

16. An apparatus according to Claim 15, wherein said digital image is a color image, and
wherein said remote-end CPU further comprises:

(i) an analog to digital converter in electronic communication with
said tuner, said analog to digital converter forming a binary
representation of said baseband video signal and providing said
binary representation to said remote-end CPU.

17. A remote unitary module for controlling access to a plurality of video channels that are
distributed over a communications conduit,

wherein the communications conduit has a head-end and at least one remote-end,

said remote unitary module being positioned along a remote-end of the
communications conduit, and

said remote unitary module being provided with changeable list of
permitted video channel numbers,

said remote unitary module, comprising:

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18. A method of simultaneous bi-directional transmission of voice and data over a communications conduit between a head-end module and a remote unitary module, said communications conduit having a head-end and at least one remote end, said remote unitary module being positionable along a particular remote end of the communications conduit, and said head-end unit being positionable along the head-end of the communications conduit, and wherein there is provided a remote-end signal and a head-end signal, said remote-end signal originating at the particular remote end of the communications conduit, and the head-end signal originating at the head-end of the communications conduit,

comprising the steps of:

- (a) assigning a receiving PCM slot number and a receiving PCM channel to said remote unitary module, said receiving PCM channel corresponding to a first predetermined frequency band;
- (b) assigning a sending PCM slot number and a sending PCM channel to said remote unitary module, said sending PCM channel corresponding to a second predetermined frequency band;
- (c) transmitting said head-end signal to said remote unitary module over the communications conduit, said transmission comprising the steps of:
 - (c1) PCM encoding said head-end signal into said receiving PCM slot number, thereby creating a head-end PCM bitstream;

(c2) modulating said head-end PCM bitstream to said first predetermined frequency band, thereby creating a modulated head-end PCM bitstream; and,

(c3) transmitting said modulated head-end PCM bitstream over said communications conduit;

(d) receiving said head-end signal in said remote unitary module through the communications conduit, said reception comprising the steps of:

(d1) accessing said communications conduit;

(d2) demodulating from said first predetermined frequency band said modulated head-end PCM bitstream, thereby creating a remote representation of said head-end PCM bitstream; and,

(d3) extracting a signal stored in said receiving PCM slot number from said remote representation of said head-end PCM bitstream, thereby creating a remote digital representation of said head-end signal;

(e) transmitting said remote-end signal to said head-end module over the communications conduit, said transmission comprising the steps of:

(e1) PCM encoding said remote-end signal into said sending PCM slot number, thereby creating a remote-end PCM bitstream;

(e2) modulating said remote-end PCM bitstream to said second predetermined frequency band, thereby creating a modulated remote-end PCM bitstream; and,

(e3) transmitting said modulated remote-end PCM bitstream over said communications conduit;

and,

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- (f) receiving said remote-end signal in said head-end module through the communications conduit, said reception comprising the steps of:
- (f1) accessing said communications conduit;
 - (f2) demodulating from said second predetermined frequency band said modulated remote-end PCM bitstream, thereby creating a head-end representation of said remote-end PCM bitstream; and,
 - (f3) extracting a signal stored in said sending PCM slot number from said head-end representation of said remote-end PCM bitstream, thereby creating a head-end digital representation of said head-end signal;
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19. A method of sensing and transmitting short messages such as alarms from a remote unitary module to a head-end module over a communications conduit,
- said communications conduit having a head-end and at least one remote-end, said remote unitary module being positioned along a particular remote end of the communications conduit,
- said head-end unit being positioned along the head-end of the communications conduit, and,
- wherein is provided at least one alarm sensor, each of said at least one alarm sensors exhibiting at least two electronic states,
- 20 comprising the steps of:
- (a) assigning a sending PCM slot number and a sending PCM channel to said remote unitary module, said sending PCM channel corresponding to a second predetermined frequency band;
 - (b) determining an initial electronic state for each of said at least one alarm sensors;

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- (c) monitoring each of said at least one alarm sensors until a triggered sensor changes to a different electronic state;
 - (d) identifying which of said at least one alarm sensors was the triggered sensor;
 - (e) generating an alarm signal in response to said change in said triggered sensor, said alarm signal being representative of at least an identity of said triggered sensor;
 - and,
 - (f) transmitting said alarm signal to said head-end module over the communications conduit, said transmission comprising the steps of:
 - (f1) PCM encoding said alarm signal into said sending PCM slot number, thereby creating a remote-end PCM bitstream;
 - (f2) modulating said remote-end PCM bitstream to said second predetermined frequency band, thereby creating a modulated remote-end PCM bitstream;
 - and,
 - (f3) transmitting said modulated remote-end PCM bitstream over said communications conduit to said head-end module.
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20. A method according to Claim 19, further comprising the steps of:

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- (g) receiving said alarm signal in said head-end module through the communications conduit, said reception comprising the steps of:
 - (g1) accessing said communications conduit;
 - (g2) demodulating from said second predetermined frequency band said modulated remote-end PCM bitstream, thereby creating a head-end representation of said remote-end PCM bitstream; and,

(g3) extracting a signal stored in said sending PCM slot from said head-end representation of said remote-end PCM bitstream, thereby creating a head-end digital representation of said alarm signal.

5 21. A method of transmitting a digital image over a communications conduit, said communications conduit having a head-end and at least one remote-end, wherein is provided a head-end module and a plurality of remote unitary modules,

each of said plurality of remote unitary modules being positioned along a remote end of the communications conduit,

10 said head-end unit being positioned along the head-end of the communications conduit, and,

wherein said digital image is comprised of a plurality of scan lines,

comprising the steps of:

- 15 (a) assigning an individual security key code to each of said plurality of remote unitary modules;
- (b) identifying a particular remote unitary module that is to receive said digital image and a particular individual security key code assigned thereto;
- (c) within said head-end module,
- (c1) obtaining a predetermined scan line of said digital image;
- 20 (c2) impressing said particular individual security key code into said predetermined scan line, thereby creating a modified digital image;
- (c3) creating a video representation of said modified digital image, said video representation of said modified digital image having a plurality of scan lines,

(c4) broadcasting said video representation of said modified digital image over said communications conduit;

(d) within at least one of said at least one remote unitary modules,

(d1) receiving said video representation of said modified digital image from said communications conduit;

(d2) identifying said predetermined scan line,

(d3) extracting said particular individual security key code from said predetermined scan line, thereby forming an extracted key,

(d4) comparing said extracted key with the assigned individual security key for this remote unitary module, and,

if said assigned individual security key for this remote unitary module is equal to said extracted key,

(d5) storing a numerical representation of at least a portion of said video representation of said modified digital image for later viewing.

22. A method of controlling access to a plurality of video channels that are distributed over a communications conduit, each of said video channels being associated with a video channel number, wherein is provided the apparatus of Claim 17, and,

wherein the communications conduit has a head-end and at least one remote-end,

wherein is provided a plurality of remote unitary modules positioned along a remote-end of said communications conduit,

each of said plurality of remote unitary modules having a changeable list of permitted video channel numbers, and,

~~comprising the steps of:~~

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- (a) assigning an individual security key code to each of said plurality of remote unitary modules;
 - (b) identifying at least one remote unitary module that is to receive a changed list of permitted video channel numbers and identifying the individual security key code assigned thereto;
 - (c) obtaining a predetermined scan line of said digital image;
 - (d) impressing said identified individual security key code into said predetermined scan line, thereby creating a modified digital image;
 - (e) impressing said changed list of permitted video channel numbers into a second predetermined scan line, thereby creating a further modified digital image;
 - (f) creating a video representation of said further modified digital image;
 - (g) broadcasting said video representation of said further modified digital image over said communications conduit;
 - (h) receiving said broadcast video representation within at least one of said at least one remote unitary modules;
 - (i) within at least one of said at least one remote unitary modules,
 - (i1) identifying said predetermined scan line,
 - (i2) extracting said identified individual security key code from said predetermined scan line, thereby forming an extracted key,
 - (i3) comparing said extracted key with the assigned individual security key for this remote unitary module,
 - (i4) if said assigned individual security key for this remote unitary module is equal to said extracted key, storing a numerical representation said changed list of permitted video channel numbers;

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- (j) monitoring said first tuner to detect said different video channel number;
 - (k) determining whether said different video channel number is among said changed list of permitted video channel numbers;
 - (l) if said different video channel number is not among said changed list of permitted video channel numbers, displaying an alternative video image for said different video channel; and,
 - (m) if said different channel number is among said changed list of permitted video channel numbers, displaying said different video channel.

10 23. A remote unitary module for simultaneous bi-directional transmission of voice and data information over a communications conduit to a head-end module, comprising:

- (a) a housing, said housing containing a connector in electrical communication with said communications conduit;
- (b) PCM encoding means within said housing for encoding an outgoing signal into a first predetermined PCM slot, thereby forming an outgoing PCM encoded signal;
- (c) RF modulation means within said housing for modulating said outgoing PCM encoded signal to a first predetermined frequency channel and sending a first modulated outgoing PCM encoded signal to said connector for transmission over the communications conduit for receipt by the head-end module;
- (d) RF demodulation means within said housing for receiving an incoming modulated PCM signal from the head-end module over the communications conduit through the connector, said RF demodulation means demodulating said incoming modulated PCM signal from a second predetermined frequency channel, thereby forming an incoming PCM encoded signal; and,

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- (e) PCM decoding means within said housing for decoding said incoming PCM encoded signal from a second predetermined PCM slot, thereby forming a digital representation of said incoming modulated PCM signal from said head-end module.

24. A head-end module for simultaneous bi-directional transmission of voice and data information over a communications conduit to a remote unitary module, comprising:

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- (a) PCM encoding means for encoding an outgoing signal into a first predetermined PCM slot, thereby forming an outgoing PCM encoded signal;
- (b) RF modulation means modulating said outgoing PCM encoded signal to a first predetermined frequency channel and transmitting a first modulated outgoing PCM encoded signal over the communications conduit for receipt by the remote unitary module;
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- (c) RF demodulation means for receiving an incoming modulated PCM signal from the remote unitary module over the communications conduit, said RF demodulation means demodulating said incoming modulated PCM signal from a second predetermined frequency channel, thereby forming an incoming PCM encoded signal; and,
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- (d) PCM decoding means for decoding said incoming PCM encoded signal from a second predetermined PCM slot, thereby forming a digital representation of said incoming modulated PCM signal from said remote unitary module.

25. A system for simultaneous bi-directional transmission of voice and data information over a communications conduit, said communications conduit having a head-end and at least one remote end, comprising:

(a) at least one remote unitary module positionable along a remote end of said communications conduit and in electronic communication therewith, each of said at least one remote unitary modules comprising:

(a1) PCM encoding means for encoding an outgoing signal into a first predetermined PCM slot, thereby forming an outgoing PCM encoded signal, said first predetermined PCM slot being different for each remote unitary module;

(a2) RF modulation means modulating said outgoing PCM encoded signal to a first predetermined frequency channel and transmitting a first modulated outgoing PCM encoded signal over the communications conduit for receipt by a head-end module;

(a3) RF demodulation means for receiving an incoming modulated PCM signal from said head-end module over the communications conduit, said RF demodulation means demodulating said incoming modulated PCM signal from a second predetermined frequency channel, thereby forming an incoming PCM encoded signal; and,

(a4) PCM decoding means for decoding said incoming PCM encoded signal from a second predetermined PCM slot, thereby forming a digital representation of said incoming modulated PCM signal from said head-end module, said second predetermined PCM slot being different for each remote unitary module;

(b) wherein, said head-end module is positionable along the head-end of said communications conduit and comprises:

(b1) PCM encoding means for encoding an outgoing signal into said second predetermined PCM slot, thereby forming an outgoing PCM encoded signal;

(b2) RF modulation means modulating said outgoing PCM encoded signal to a second predetermined frequency channel and transmitting a second modulated outgoing PCM encoded signal over the communications conduit for receipt by a predetermined remote unitary module;

(b3) RF demodulation means for receiving an incoming modulated PCM signal from the predetermined remote unitary module over the communications conduit, said RF demodulation means demodulating said incoming modulated PCM signal from said second predetermined frequency channel, thereby forming an incoming PCM encoded signal; and

(b4) PCM decoding means for decoding said incoming PCM encoded signal from said second predetermined PCM slot, thereby forming a digital representation of said incoming modulated PCM signal from said predetermined remote unitary module.

26. A remote unitary module for simultaneous bi-directional transmission of voice and data information over a communications conduit to a head-end module according to Claim 23, wherein said outgoing signal is an alarm signal, further comprising:

(f) alarm input means within said housing for sensing a changeable status of at least one alarm switch, said alarm input means

generating an electronic signal in response to a change in status of any of
said at least one changeable status alarm switch; and,

- (g) an alarm signal generator, said alarm signal generator
being in electronic communication with said alarm input means,
generating an alarm signal in response to said electronic signal, and,
providing said alarm signal to said PCM encoding means.

27. A remote unitary module for simultaneous bi-directional transmission of voice and data
information over a communications conduit to a head-end module according to Claim 26,
wherein said outgoing signal is an alarm signal, and wherein said said at least one alarm
switch is selected from the group consisting of a fire alarm, a panic button, a smoke
alarm, a trip switch, a pressure plate, a contact switch, a proximity switch, a heat detector,
~~and a nurse call switch.~~

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